

# Type 310A-32A Pressure Reducing Regulator and Type 310A-32A-32A Working Monitor Regulator

## Introduction

The Type 310A pilot-operated high-pressure regulator (Figure 1) is used where high capacity and accurate control are essential. This regulator includes one Type 32A pilot assembly mounted on the main valve for pressure reducing or wide-open monitoring applications, or two Type 32A pilots mounted on the main valve for working monitor applications.

## Features

- **Accurate Control**—Molded pilot diaphragms provide a narrow proportional band and registration of outlet pressure on the main diaphragm allows excellent control sensitivity.
- **Tight Shutoff**—Throttling-sleeve design with Polytetrafluoroethylene (PTFE) seat in the body ensures positive shutoff.
- **High Capacity**—Straight-through flow passage allows exceptionally high capacities and stable operation.
- **Reduced Relief Requirements**—Optional restricted trim helps reduce relief valve size requirements; the regulator is easily converted to full capacity by changing the trim, if flow conditions increase.
- **Fast Speed of Response**—Designed to meet stringent speed of response requirements for turbine startup and fuel gas applications.
- **Minimum Installation Space Required**—Since main valve design incorporates actuator spring, less installation space is needed for the Type 310A than for other regulators of comparable capacity.

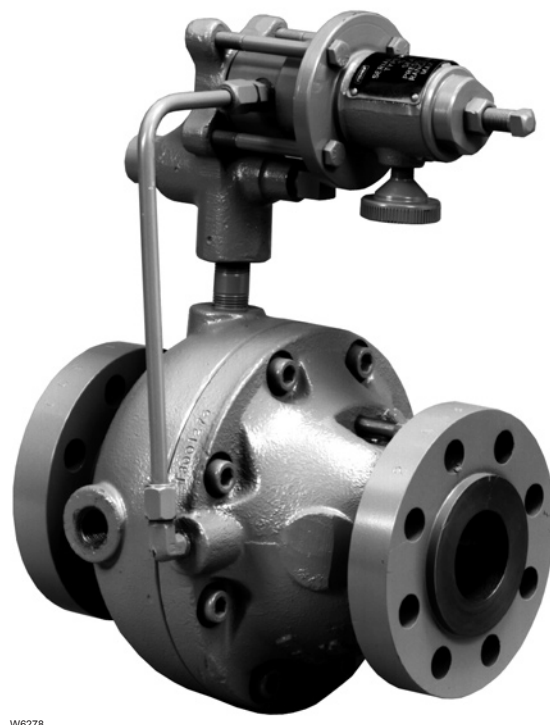


Figure 1. Type 310A Regulator with Type 32A Pilot

## Specifications

### Available Configurations

**Type 310A-32A:** Type 310A main valve with one Type 32A pilot for standard pressure-reducing and wide-open monitoring applications

**Type 310A-32A-32A:** Type 310A main valve with two Type 32A pilots for working monitor applications

### Body Sizes and End Connection Styles

1-inch body with NPT ends; and 1, 2, 3, 4, or 4 x 6-inch (DN 25, 50, 80, 100, and 100 x 150) body with CL300 RF or CL600 RF flanged ends

### Maximum Inlet and Pilot Supply Pressures<sup>(1)</sup>

**NPT and CL600 RF:** 1500 psig (103 bar)

**CL300 RF:** 750 psig (51,7 bar)

### Maximum Pressure Drop<sup>(1)</sup>

**NPT and CL600 RF:** 1425 psig (98,3 bar)

**CL300 RF:** 720 psig (49,6 bar)

### Maximum Outlet Pressure<sup>(1)</sup>

**Operating:** 700 psig (48,3 bar)

**To Avoid Internal Part Damage:** 800 psig (55,2 bar)  
Exceeding this pressure may result in gas venting from pilot spring case.

**Emergency (Casing):** 1500 psig (103 bar) or maximum inlet pressure whichever is lower.

### Outlet Pressure Ranges and Proportional Bands

See Table 1

### Maximum Travel

See Table 3

### Minimum Differential Pressure<sup>(1)</sup>

15 psig (1,0 bar)

### Flow Coefficients

See Tables 4, 5, and 6

### IEC Sizing Coefficients

See Table 7

### Flow Capacities

See Tables 8, 9, 10, 11, and 12

### Maximum Temperature Capabilities<sup>(1)</sup>

**Nitrile (NBR) with Wiper Ring:**

-20° to 150°F (-29° to 66°C)

**Fluorocarbon (FKM) with Wiper Ring:**

0° to 150°F (-18° to 66°C)

**Fluorocarbon (FKM) without Wiper Ring:**

0° to 300°F (-18° to 149°C)

### External Pilot Supply Connection

1/4-inch NPT

### Pilot Vent Connection

1/4-inch NPT

### Pressure Connections

See Figure 9

### Options

- Main valve body without pilot for on-off service
- Remote-mounted pilot
- Electrically controlled pilot using Type 662 Kixcel™
- Travel indicator
- Pressure loaded pilot
- Type 252 pilot supply filter
- Backpressure protection system
- Restricted Trim (30%, 50%, or 70%)
- NACE construction
- Inlet tap

### Approximate Weights

**1-inch (DN 25):** 45 pounds (20 kg)

**2-inch (DN 50):** 90 pounds (41 kg)

**3-inch (DN 80):** 145 pounds (66 kg)

**4-inch (DN 100):** 190 pounds (86 kg)

**4 x 6-inch (DN 100 x 150):** 235 pounds (107 kg)

### Construction Materials

#### Main Valve

*Body:* WCC steel

*Throttling Sleeve:* Stainless steel

*Seat:* PTFE

*Diaphragm Plates:* Steel

*Diaphragm and O-rings:* Nitrile (NBR) (**standard**) or Fluorocarbon (FKM)

*Main Spring:* Steel

*Valve Plug:* Stainless steel

*Travel Indicator Rod:* Stainless steel

*Wiper Ring:* Nitrile (NBR)

#### Pilot

*Spring Case, Diaphragm Spacer, Pilot Body, and*

*Spring Case Cap:* Cast steel

*Adjusting Screw and Diaphragm Plate:* Plated steel

*Diaphragm:* Nitrile (NBR) (**standard**) or Fluorocarbon (FKM)

*Orifice Assembly and Yoke:* Stainless steel

*Valve Disk Assembly:* Stainless steel/Nitrile (NBR) (**standard**) or Stainless steel/Fluorocarbon (FKM)

*Bleed Valve and Orifice:* Stainless steel

*Piston and Piston Seat Assembly:* Stainless steel and Nylon (PA)

*Pilot Main Spring:* Plated steel

1. The pressure/temperature limits in this bulletin or any applicable standard limitation should not be exceeded.

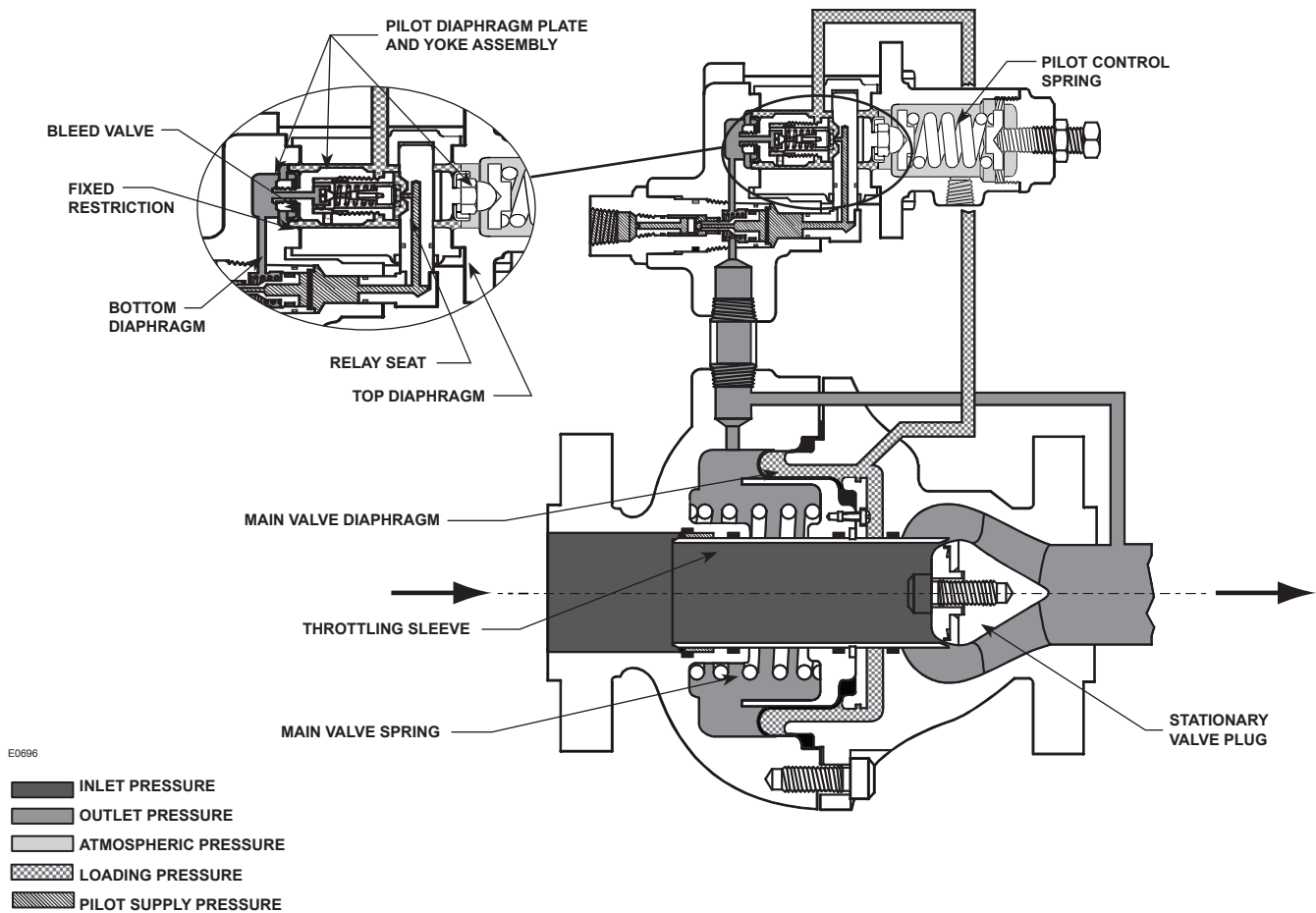


Figure 2. Type 310A-32A Regulator Operational Schematic

## Principle of Operation

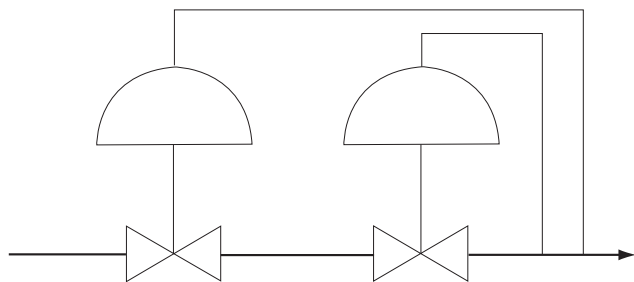
### Single-Pilot Regulator (Figure 2)

The regulator inlet pressure enters the pilot through the external pilot supply line and is utilized as the supply pressure for the pilot. The setting of the pilot control spring determines the reduced outlet (downstream) pressure.

In operation, assume the outlet pressure is less than the setting of the pilot control spring. Pilot control spring force then overcomes the force resulting from outlet pressure acting on the bottom diaphragm. The spring pushes the diaphragm plate and yoke assembly away from the relay seat, opening it and supplying additional loading pressure to the main valve diaphragm. When this additional loading pressure exceeds the force resulting from outlet pressure acting on the main valve diaphragm plus

the force of the main valve spring, the diaphragm is pushed away from the stationary valve plug. The throttling sleeve opens wider, and the required gas is supplied to the downstream system.

When gas demand in the downstream system has been satisfied, the outlet pressure tends to increase. The increased outlet pressure acting on the bottom diaphragm of the diaphragm plate and yoke assembly results in a force that overcomes the pilot spring setting and forces the assembly toward the relay seat, closing it. The loading pressure acting on the main valve diaphragm bleeds to the downstream system through the fixed restriction in the diaphragm plate and yoke assembly. When rapid main valve closure is required by unusual control conditions, the bleed valve opens for increased bleed rate. The force of increased outlet pressure acting on the main valve diaphragm plus the main valve spring force overcomes the force of decreased loading pressure acting on the main valve diaphragm and moves the



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**Figure 3.** *Typical Wide-Open Monitor*

throttling sleeve toward the stationary valve plug to decrease the gas flow to the downstream system.

The top diaphragm in the pilot acts as a sealing member for the loading chamber and as a balancing member to the bottom diaphragm. The two diaphragms are connected by a yoke. Pressure change to the center chamber has little effect on the positioning of the valve disk.

## Monitor Systems

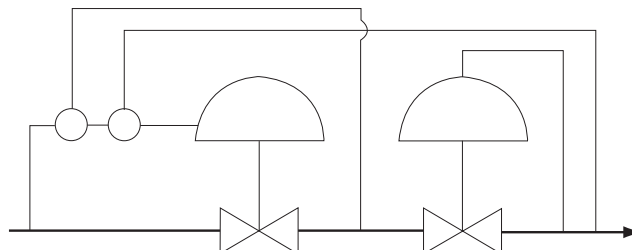
### *Wide-Open Monitors (Figure 3)*

Monitoring regulators serve as overpressure protection devices to limit system pressure in the event of failure of working regulators feeding the system. The control line of a wide-open monitoring regulator may be connected downstream of the working regulator, so that during normal operation the wide-open monitoring regulator is standing wide open with the pressure reduction being taken across the working regulator. Only in case of working regulator failure does the wide-open monitoring regulator operate.

### *Working Monitors (Figures 4 and 5)*

The Type 310A-32A-32A working monitor regulator differs from wide-open monitors in that it has working monitor capability. This means that it normally reduces pressure and throttles while the second-stage regulator is in operation. Should the second-stage working regulator fail open, the Type 310A-32A-32A will take over the entire pressure reduction function.

The working monitor pilots are adaptations of two Type 32A pilots with special internal parts, due to the pressure conditions in this piloting system. A spacer blocks open the differential regulator portion



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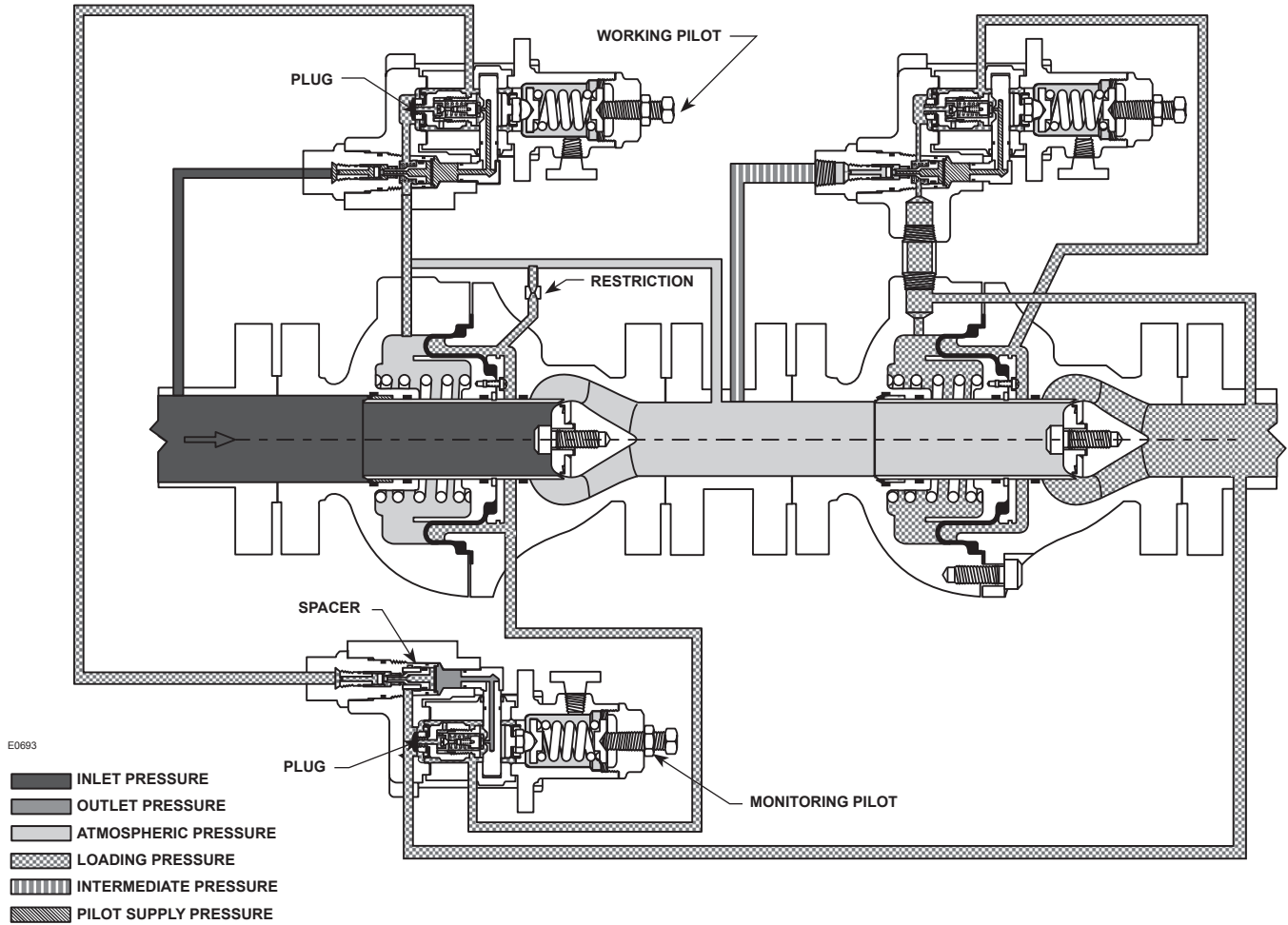
**Figure 4.** *Typical Working Monitor*

of the Type 32A monitoring pilot. A plug in both the working and monitoring pilots makes the internal bleed nonfunctional. A restriction placed in the external tubing between the diaphragm loading pressure and the intermediate pressure acts as a downstream bleed.

If the second-stage working regulator fails to open, the distribution pressure increases to the setting of the Type 32A monitoring pilot (slightly higher than the original distribution pressure) and is controlled at that level by the Type 310A-32A-32A. Thus, downstream equipment is protected against a major overpressure condition without disrupting service or venting gas to atmosphere.

In the working pilot, the inlet pressure is reduced to a pre-determined pilot supply pressure, which is further reduced to loading pressure for the Type 310A diaphragm. The loading pressure is piped through the portion of the monitoring pilot blocked open by the spacer and, as long as distribution pressure is below the setting of the monitoring pilot, passes through the relay orifice of the monitoring pilot to the diaphragm case of the Type 310A body.

Distribution pressure is piped back to the monitoring pilot. As long as the distribution pressure is less than the monitoring pilot setting, the working pilot controls the Type 310A to maintain intermediate pressure. If the distribution pressure increases to the monitoring pilot setting, the monitoring pilot relay orifice starts to throttle the loading pressure to the Type 310A diaphragm. This allows the Type 310A main spring to move the throttling sleeve closer to the seat and control distribution pressure at the monitoring pilot set point. Therefore, failure of the second-stage working regulator is controlled with only a slight increase in distribution pressure, with the Type 310A-32A-32A accomplishing the entire pressure reduction function.



**Figure 5.** Type 310A-32A-32A Working Monitor Regulator Operational Schematic

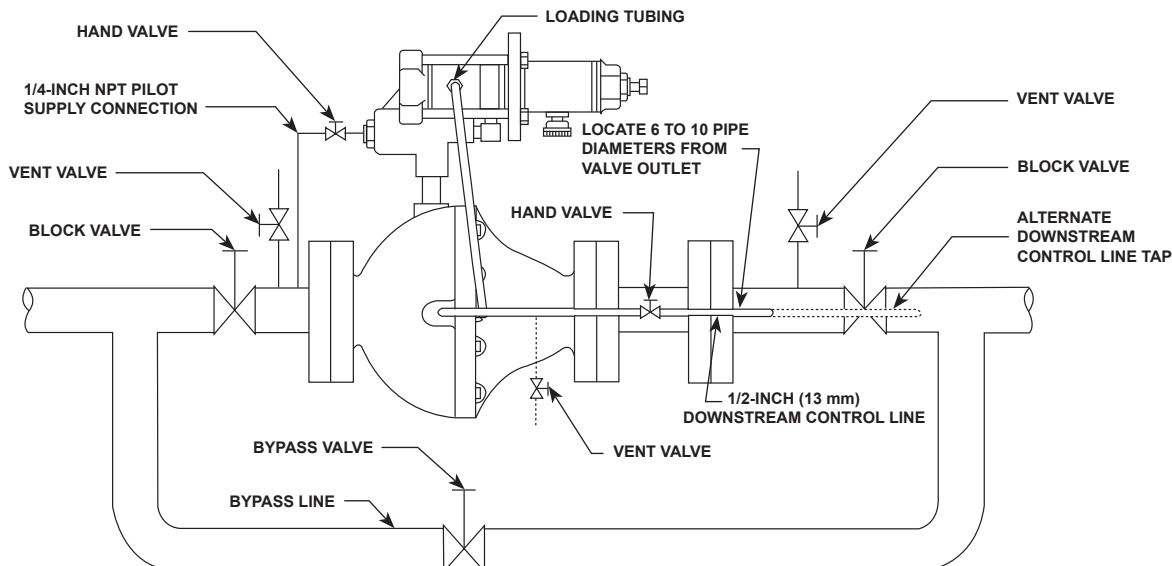
**Table 1.** Outlet Pressure Ranges

OUTLET PRESSURE RANGE, PSIG (bar)	PROPORTIONAL BAND, PSIG (bar)	SPRING COLOR	SPRING PART NUMBER
10 to 20 (0,69 to 1,4)	0.5 (0,03)	Silver	1D809627022
10 to 100 (0,69 to 6,9)	2 (0,14)	Yellow	1E392527022
100 to 250 (6,9 to 17,2)	5 (0,34)	Blue	1D387227022
250 to 600 (17,2 to 41,4)	12 (0,83)	Red	1D465127142
400 to 700 (27,6 to 48,3) <sup>1)</sup>	20 (1,4)	Green	13A5543X012

1. Available with Nitrile (NBR) pilot diaphragm only.

**Table 2.** Recommended Minimum Differential Between Monitoring Pilot Setting and Distribution Pressure

OUTLET PRESSURE RANGE, PSIG (bar)	SPRING COLOR	SPRING PART NUMBER	MINIMUM PRESSURE AT WHICH MONITORING PILOT CAN BE SET, PSIG (bar)
10 to 20 (0,69 to 1,4)	Silver	1D809627022	3.0 (0,21) over normal distribution pressure
10 to 100 (0,69 to 6,9)	Yellow	1E392527022	5.0 (0,34) over normal distribution pressure
100 to 250 (6,9 to 17,2)	Blue	1D387227022	10 (0,69) over normal distribution pressure
250 to 600 (17,2 to 41,4)	Red	1D465127142	15 (1,0) over normal distribution pressure
400 to 700 (27,6 to 48,3)	Green	13A5543X012	20 (1,4) over normal distribution pressure



**Figure 6.** Typical Pressure Reducing Installation

## Installation

The Type 310A may be installed in any position, but is normally installed in a horizontal pipeline with the pilot or pilots above the body. See Figures 6, 7, and 8 for typical piping installation.

## Capacity Information

### Note

**Type 310A regulator flow capacities are laboratory verified; therefore, they may be sized for 100% flow using capacities as shown in Tables 8, 9, 10, 11, and 12. It is not necessary to reduce published capacities.**

Tables 8, 9, 10, 11, and 12 show the natural gas regulating capacities of the Type 310A regulator at selected inlet pressures and outlet pressure settings. Flows are in thousands of SCFH at 60°F and 14.7 psia (and in thousands of Nm<sup>3</sup>/h at 0°C and 1,01325 bar) of 0.6 specific gravity natural gas.

To determine equivalent capacities for air, propane, butane, or nitrogen, multiply the capacity by the following appropriate conversion factor: 0.775 for air, 0.628 for propane, 0.548 for butane, or 0.789 for nitrogen. For gases of other specific gravities, multiply the given capacity by 0.775, and divide by the square root of the appropriate specific gravity. Then,

if capacity is desired in normal cubic meters per hour at 0°C and 1,01325 bar, multiply SCFH by 0.0268.

To find approximate regulating capacities at pressure settings not given in Tables 8, 9, 10, 11, and 12 or to find wide-open flow capacities for relief sizing at any inlet pressure, perform one of the following procedures. Then, if necessary, convert using the factors provided above.

For critical pressure drops (absolute outlet pressure equal to or less than one-half of absolute inlet pressure), use the following formula:

$$Q = (P_1)(C_g)(1.29)$$

For pressure drops lower than critical (absolute outlet pressure greater than one-half of absolute inlet pressure).

$$Q = \sqrt{\frac{520}{GT}} C_g P_1 \sin \left( \frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right) \text{ DEG}$$

where,

Q = gas flow rate, SCFH

P<sub>1</sub> = absolute inlet pressure, psia  
(P<sub>1</sub> gauge + 14.7)

C<sub>g</sub> = regulating or wide-open gas sizing coefficient from Table 4, 5, or 6

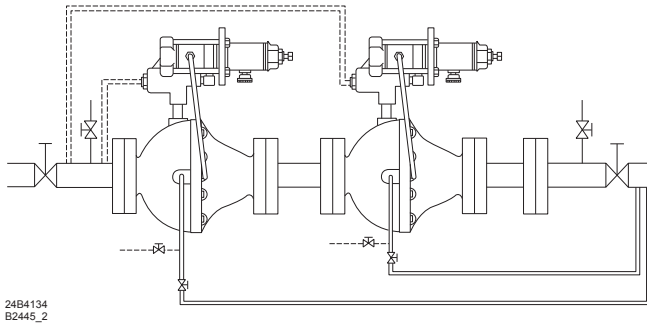
G = gas specific gravity of the gas

T = absolute temperature of gas at inlet, °Rankine

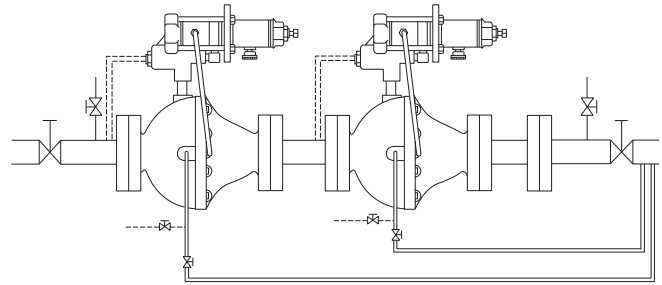
C<sub>1</sub> = flow coefficient

ΔP = pressure drop across the regulator, psi



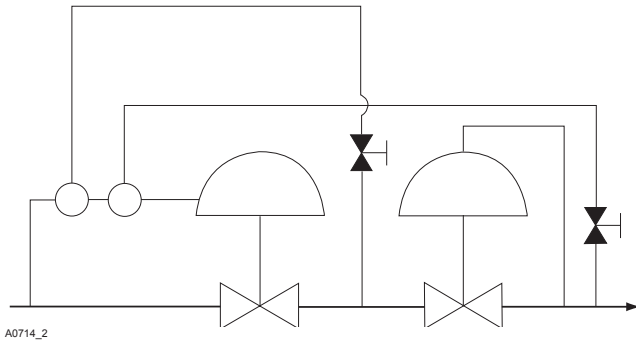


**FLEXIBLE WIDE-OPEN MONITOR ARRANGEMENT THAT PERMITS WIDE-OPEN MONITOR TO BE EITHER UPSTREAM OR DOWNSTREAM OF THE WORKING REGULATOR**



**MINIMUM PIPING WIDE-OPEN MONITOR ARRANGEMENT THAT REQUIRES WIDE-OPEN MONITOR ALWAYS TO BE UPSTREAM OF WORKING REGULATOR**

**Figure 7. Typical Wide-Open Monitor Installation**



**Figure 8. Typical Working Monitor Installation**

**Table 3. Maximum Travel**

BODY SIZE, INCHES (DN)	MAXIMUM TRAVEL, INCH (mm)
1 (25)	0.5 (13)
2 (50)	0.875 (22)
3 (80)	1 (25)
4 (100)	1.125 (28)
4 x 6 (100 x 150)	1.5 (38)

**Table 4. Wide-Open Flow Coefficients for Relief Valve Sizing with Body Size Piping for Relief Valve Sizing**

TRIM SIZE		BODY SIZE, INCHES (DN)				
		1 (25)	2 (50)	3 (80)	4 (100)	4 x 6 (100 x 150)
30%	C <sub>g</sub>	238	835	1810	3080	4400
	C <sub>v</sub>	8.6	30.6	64.6	114.9	181.8
	C <sub>1</sub>	27.7	27.3	28	26.8	24.2
50%	C <sub>g</sub>	313	1240	2810	4620	6600
	C <sub>v</sub>	10.3	46.3	99.3	172.4	280.9
	C <sub>1</sub>	30.4	26.8	28.3	26.8	23.5
70%	C <sub>g</sub>	----	1800	3780	6660	9000
	C <sub>v</sub>	----	69	129	213	360
	C <sub>1</sub>	----	26.2	29.3	31.3	25
100%	C <sub>g</sub>	612	2610	5510	8830	16200
	C <sub>v</sub>	22	95	200	322	661
	C <sub>1</sub>	28.1	27.5	27.5	27.4	24.5

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**Table 5. Regulating Flow Coefficients for Body Size Piping**

COEFFICIENT AT PERCENT OF MAXIMUM TRAVEL		TRIM SIZE (PERCENT OF FLOW CAPACITY) BY BODY SIZE, INCHES (DN)																		
		1 (25)			2 (50)				3 (80)				4 (100)				4 x 6 (100 x 150)			
		100%	50%	30%	100%	70%	50%	30%	100%	70%	50%	30%	100%	70%	50%	30%	100%	70%	50%	30%
10%	C <sub>g</sub>	65	60	56	210	200	190	185	346	340	325	305	805	725	615	510	895	800	780	760
	C <sub>v</sub>	2.2	2.0	2.0	7.6	7.5	6.9	7.0	12.5	11.6	11.3	10.8	29.6	24.0	22.6	19.2	41.6	32.0	33.2	31.4
20%	C <sub>g</sub>	115	93	83	460	396	311	260	810	735	615	460	1800	1310	1040	705	2235	1680	1420	1160
	C <sub>v</sub>	4.0	3.2	3.0	16.6	14.9	11.3	9.8	29.3	25.2	21.4	16.3	66.2	43.4	38.2	26.6	104.0	67.2	60.4	47.9
30%	C <sub>g</sub>	210	124	107	810	583	430	325	1520	1120	85	606	3100	1990	1480	917	3800	2550	2050	1550
	C <sub>v</sub>	7.3	4.2	3.8	29.2	21.9	15.6	12.3	55.1	38.4	3.0	21.4	114.0	65.9	54.4	34.6	176.7	102.0	87.2	64.0
40%	C <sub>g</sub>	343	151	126	1120	758	540	385	2380	1480	1130	755	4350	2650	1900	1130	5510	3300	2650	1940
	C <sub>v</sub>	11.9	5.1	4.5	40.4	28.5	19.6	14.6	86.2	50.7	39.4	26.7	159.9	87.7	69.9	42.6	256.3	132.0	112.8	80.2
50%	C <sub>g</sub>	427	178	140	1440	925	646	444	3270	1840	1380	902	5480	3280	2300	1340	7300	4150	3250	2330
	C <sub>v</sub>	14.8	6.0	5.0	52.0	34.8	23.4	16.8	118.5	63.0	48.1	31.9	201.5	108.6	84.6	50.6	339.5	166.0	138.3	96.3
60%	C <sub>g</sub>	485	204	150	1750	1090	744	502	3890	2190	1630	1060	6310	3950	2730	1540	9010	5010	3840	2720
	C <sub>v</sub>	16.8	6.9	5.4	63.2	41.0	27.0	19.0	140.9	75.0	56.8	37.5	232.0	130.8	110.4	58.1	419.1	200.4	163.4	112.4
70%	C <sub>g</sub>	523	226	159	2040	1240	841	561	4410	2540	1880	1210	7040	4550	3140	1740	10580	5870	4430	3110
	C <sub>v</sub>	18.2	7.7	5.7	73.6	46.6	30.5	21.3	159.8	87.0	65.5	42.8	258.8	150.7	115.4	65.7	492.1	234.8	188.5	128.5
80%	C <sub>g</sub>	549	250	168	2260	1400	946	624	4820	2900	2130	1360	7640	5110	3540	1950	12100	6720	5030	3500
	C <sub>v</sub>	19	8	6	82	53	34	24	175	99	74	48	281	169	130	74	563	269	214	145
90%	C <sub>g</sub>	573	272	177	2430	1550	1040	690	5080	3210	2380	1510	8140	5700	3950	2200	13600	7570	5650	3870
	C <sub>v</sub>	20	9	6	88	58	38	26	184	110	83	53	299	189	145	83	633	303	240	160
100%	C <sub>g</sub>	597	289	184	2520	1700	1130	761	5330	3530	2640	1670	8670	6390	4390	2680	14900	8450	6320	4120
	C <sub>v</sub>	21	10	7	91	64	41	29	193	121	92	59	319	212	161	101	693	338	269	174
C <sub>1</sub>		28.8	29.5	28	27.7	26.6	27.6	26.4	27.6	29.2	28.7	28.3	27.2	30.2	27.2	26.5	24.5	25	23.5	24.2

**Table 6. Regulating Flow Coefficients for 2:1 Swaged Piping and 100% Trim**

COEFFICIENT AT PERCENT OF MAXIMUM TRAVEL		TRIM SIZE (PERCENT OF FLOW CAPACITY) BY BODY SIZE, INCHES (DN)				
		1 (25)	2 (50)	3 (80)	4 (100)	4 x 6 (100 x 150)
10%	C <sub>g</sub>	60	210	340	810	850
	C <sub>v</sub>	2.0	7.1	11.6	28.1	29.8
20%	C <sub>g</sub>	115	450	825	1700	2050
	C <sub>v</sub>	3.8	15.2	28.3	59.0	71.9
30%	C <sub>g</sub>	205	795	1540	3050	3300
	C <sub>v</sub>	6.7	26.8	52.7	105.9	115.8
40%	C <sub>g</sub>	330	1110	2350	4300	4650
	C <sub>v</sub>	10.8	37.4	80.5	149.3	163.2
50%	C <sub>g</sub>	395	1380	3025	5400	6050
	C <sub>v</sub>	13.0	46.5	103.6	187.5	212.3
60%	C <sub>g</sub>	450	1610	3550	6200	7430
	C <sub>v</sub>	14.8	54.2	121.6	215.3	260.7
70%	C <sub>g</sub>	490	1800	3900	3900	8700
	C <sub>v</sub>	16.1	60.6	133.6	135.4	305.3
80%	C <sub>g</sub>	515	1960	4200	7400	9860
	C <sub>v</sub>	17	66	144	257	346
90%	C <sub>g</sub>	533	2055	4440	7800	10800
	C <sub>v</sub>	17	69	152	271	379
100%	C <sub>g</sub>	548	2140	4610	8150	11600
	C <sub>v</sub>	18	72	158	283	407
C <sub>1</sub>		30.5	29.7	29.2	28.8	28.5

**Table 7. IEC Sizing Coefficients**

BODY SIZE, INCHES (DN)	1 (25)	2 (50)	3 (80)	4 (100)	4 x 6 (100 x 150)
X <sub>t</sub>	0.53	0.49	0.48	0.47	0.29
F <sub>D</sub>	0.66	0.59	0.56	0.48	0.58
F <sub>L</sub>	0.74	0.74	0.74	0.74	0.74



**Table 8. 1-inch (DN 25) Body Capacities with 100% Trim and Body Size Piping (Thousands of SCFH (Nm<sup>3</sup>/h)) of 0.6 Specific Gravity Gas**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	25 (1,7)	50 (3,5)	75 (5,2)	100 (6,9)	125 (8,6)	150 (10,3)	175 (12,1)	200 (13,8)	225 (15,5)	250 (17,2)	300 (20,7)
50 (3,5)	48 (1,3)										
75 (5,2)	69 (1,8)	61 (1,6)									
100 (6,9)	88 (2,4)	87 (2,3)	73 (1,9)								
150 (10,3)	127 (3,4)	127 (3,4)	125 (3,4)	115 (3,1)	92 (2,5)						
200 (13,8)	165 (4,4)	165 (4,4)	165 (4,4)	163 (4,4)	156 (4,2)	139 (3,7)	107 (2,9)				
250 (17,2)	204 (5,5)	204 (5,5)	204 (5,5)	204 (5,5)	202 (5,4)	195 (5,2)	182 (4,9)	160 (4,3)	121 (3,2)		
300 (20,7)	243 (6,5)	243 (6,5)	243 (6,5)	243 (6,5)	242 (6,5)	240 (6,4)	234 (6,3)	223 (6,0)	206 (5,5)	178 (4,8)	
350 (24,1)	281 (7,5)	281 (7,5)	281 (7,5)	281 (7,5)	281 (7,5)	281 (7,5)	278 (7,5)	273 (7,3)	263 (7,1)	248 (6,6)	195 (5,2)
400 (27,6)	320 (8,6)	320 (8,6)	320 (8,6)	320 (8,6)	320 (8,6)	320 (8,6)	319 (8,5)	317 (8,5)	312 (8,4)	303 (8,1)	272 (7,3)
450 (31,0)	358 (9,6)	358 (9,6)	358 (9,6)	358 (9,6)	358 (9,6)	358 (9,6)	358 (9,6)	358 (9,6)	355 (9,5)	350 (9,4)	331 (8,9)
500 (34,5)	397 (10,6)	397 (10,6)	397 (10,6)	397 (10,6)	397 (10,6)	397 (10,6)	397 (10,6)	397 (10,6)	396 (10,6)	393 (10,5)	381 (10,2)
550 (38,0)	435 (11,7)	435 (11,7)	435 (11,7)	435 (11,7)	435 (11,7)	435 (11,7)	435 (11,7)	435 (11,7)	435 (11,7)	434 (11,6)	427 (11,4)
600 (41,4)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	474 (12,7)	470 (12,6)
650 (44,8)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	512 (13,7)	511 (13,7)
700 (48,3)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)	551 (14,8)
750 (51,7)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)	589 (15,8)
800 (55,2)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)	628 (16,8)
850 (58,6)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)	666 (17,8)
900 (62,1)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)	705 (18,9)
950 (65,5)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)	744 (19,9)
1000 (68,9)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)
1100 (75,8)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)
1200 (82,7)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)
1300 (89,6)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)
1400 (96,5)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)

**Table 8. 1-inch (DN 25) Body Capacities with 100% Trim and Body Size Piping (continued)**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)									
	325 (22,4)	350 (24,1)	400 (27,6)	425 (29,3)	450 (31,0)	500 (34,5)	550 (38,0)	600 (41,4)	650 (44,8)	700 (48,3)
50 (3,5)										
75 (5,2)										
100 (6,9)										
150 (10,3)										
200 (13,8)										
250 (17,2)										
300 (20,7)										
350 (24,1)	145 (3,9)									
400 (27,6)	246 (6,6)	211 (5,7)								
450 (31,0)	315 (8,4)	294 (7,9)	225 (6,0)	165 (4,4)						
500 (34,5)	371 (9,9)	357 (9,6)	314 (8,4)	282 (7,6)	239 (6,4)					
550 (38,0)	420 (11,3)	411 (11,0)	381 (10,2)	360 (9,6)	333 (8,9)	252 (6,7)				
600 (41,4)	466 (12,5)	459 (12,3)	438 (11,7)	423 (11,3)	404 (10,8)	351 (9,4)	264 (7,1)			
650 (44,8)	508 (13,6)	504 (13,5)	489 (13,1)	478 (12,8)	465 (12,5)	427 (11,4)	369 (9,9)	276 (7,4)		
700 (48,3)	549 (14,7)	547 (14,7)	536 (14,4)	528 (14,2)	518 (13,9)	490 (13,1)	448 (12,0)	385 (10,3)	287 (7,7)	
750 (51,7)	589 (15,8)	588 (15,8)	581 (15,6)	575 (15,4)	567 (15,2)	546 (14,6)	514 (13,8)	468 (12,5)	401 (10,7)	297 (8,0)
800 (55,2)	628 (16,8)	628 (16,8)	623 (16,7)	619 (16,6)	614 (16,5)	597 (16,0)	572 (15,3)	537 (14,4)	487 (13,1)	416 (11,1)
850 (58,6)	666 (17,8)	666 (17,8)	664 (17,8)	662 (17,7)	658 (17,6)	645 (17,3)	626 (16,8)	598 (16,0)	559 (15,0)	506 (13,6)
900 (62,1)	705 (18,9)	705 (18,9)	704 (18,9)	703 (18,8)	700 (18,8)	691 (18,5)	676 (18,1)	653 (17,5)	622 (16,7)	580 (15,5)
950 (65,5)	744 (19,9)	744 (19,9)	743 (19,9)	743 (19,9)	741 (19,9)	734 (19,7)	723 (19,4)	705 (18,9)	680 (18,2)	646 (17,3)
1000 (68,9)	782 (21,0)	782 (21,0)	782 (21,0)	782 (21,0)	781 (20,9)	777 (20,8)	768 (20,6)	754 (20,2)	733 (19,6)	705 (18,9)
1100 (75,8)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	859 (23,0)	858 (23,0)	853 (22,9)	845 (22,6)	831 (22,3)	812 (21,8)
1200 (82,7)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	936 (25,1)	935 (25,1)	930 (24,9)	921 (24,7)	908 (24,3)
1300 (89,6)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1013 (27,1)	1011 (27,1)	1006 (27,0)	998 (26,7)
1400 (96,5)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1090 (29,2)	1082 (29,0)

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**Table 9. 2-inch (DN 50) Body Capacities with 100% Trim and Body Size Piping (Thousands of SCFH (Nm<sup>3</sup>/h)) of 0.6 Specific Gravity Gas**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	25 (1,7)	50 (3,5)	75 (5,2)	100 (6,9)	125 (8,6)	150 (10,3)	175 (12,1)	200 (13,8)	225 (15,5)	250 (17,2)	300 (20,7)
50 (3,5)	205 (5,5)										
75 (5,2)	292 (7,8)	265 (7,1)									
100 (6,9)	373 (10,0)	369 (9,9)	315 (8,4)								
150 (10,3)	536 (14,4)	536 (14,4)	532 (14,3)	497 (13,3)	399 (10,7)						
200 (13,8)	698 (18,7)	698 (18,7)	698 (18,7)	695 (18,6)	668 (17,9)	602 (16,1)	468 (12,5)				
250 (17,2)	861 (23,1)	861 (23,1)	861 (23,1)	861 (23,1)	858 (23,0)	835 (22,4)	785 (21,0)	693 (18,6)	529 (14,2)		
300 (20,7)	1024 (27,4)	1024 (27,4)	1024 (27,4)	1024 (27,4)	1024 (27,4)	1020 (27,3)	1000 (26,8)	959 (25,7)	889 (23,8)	775 (20,8)	
350 (24,1)	1186 (31,8)	1186 (31,8)	1186 (31,8)	1186 (31,8)	1186 (31,8)	1186 (31,8)	1183 (31,7)	1165 (31,2)	1130 (30,3)	1072 (28,7)	849 (22,8)
400 (27,6)	1349 (36,2)	1349 (36,2)	1349 (36,2)	1349 (36,2)	1349 (36,2)	1349 (36,2)	1349 (36,2)	1345 (36,0)	1329 (35,6)	1298 (34,8)	1175 (31,5)
450 (31,0)	1512 (40,5)	1512 (40,5)	1512 (40,5)	1512 (40,5)	1512 (40,5)	1512 (40,5)	1512 (40,5)	1512 (40,5)	1508 (40,4)	1493 (40,0)	1421 (38,1)
500 (34,5)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1674 (44,9)	1670 (44,8)	1631 (43,7)
550 (38,0)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1837 (49,2)	1820 (48,8)
600 (41,4)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	2000 (53,6)	1995 (53,5)
650 (44,8)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)	2162 (57,9)
700 (48,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)	2325 (62,3)
750 (51,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)	2488 (66,7)
800 (55,2)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)	2650 (71,0)
850 (58,6)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2813 (75,4)
900 (62,1)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2976 (79,8)
950 (65,5)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)
1000 (68,9)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)
1100 (75,8)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)
1200 (82,7)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)
1300 (89,6)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)
1400 (96,5)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)

**Table 9. 2-inch (DN 50) Body Capacities with 100% Trim and Body Size Piping (continued)**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	325 (22,4)	350 (24,1)	400 (27,6)	425 (29,3)	450 (31,0)	500 (34,5)	550 (38,0)	600 (41,4)	650 (44,8)	700 (48,3)	
50 (3,5)											
75 (5,2)											
100 (6,9)											
150 (10,3)											
200 (13,8)											
250 (17,2)											
300 (20,7)											
350 (24,1)	634 (17,0)										
400 (27,6)	1070 (28,7)	917 (24,6)									
450 (31,0)	1359 (36,4)	1271 (34,1)	981 (26,3)	724 (19,4)							
500 (34,5)	1592 (42,7)	1537 (41,2)	1361 (36,5)	1226 (32,9)	1041 (27,9)						
550 (38,0)	1796 (48,1)	1761 (47,2)	1645 (44,1)	1559 (41,8)	1446 (38,8)	1098 (29,4)					
600 (41,4)	1983 (53,1)	1961 (52,6)	1884 (50,5)	1824 (48,9)	1748 (46,8)	1526 (40,9)	1152 (30,9)				
650 (44,8)	2158 (57,8)	2146 (57,5)	2095 (56,1)	2054 (55,0)	2000 (53,6)	1846 (49,5)	1603 (43,0)	1204 (32,3)			
700 (48,3)	2325 (62,3)	2320 (62,2)	2289 (61,3)	2261 (60,6)	2223 (59,6)	2112 (56,6)	1939 (52,0)	1677 (44,9)	1253 (33,6)		
750 (51,7)	2488 (66,7)	2488 (66,7)	2472 (66,3)	2453 (65,7)	2427 (65,0)	2346 (62,9)	2218 (59,4)	2029 (54,4)	1746 (46,8)	1301 (34,9)	
800 (55,2)	2650 (71,0)	2650 (71,0)	2645 (70,9)	2634 (70,6)	2617 (70,1)	2558 (68,6)	2463 (66,0)	2321 (62,2)	2113 (56,6)	1814 (48,6)	
850 (58,6)	2813 (75,4)	2813 (75,4)	2813 (75,4)	2808 (75,3)	2797 (75,0)	2756 (73,9)	2685 (72,0)	2576 (69,0)	2418 (64,8)	2196 (58,9)	
900 (62,1)	2976 (79,8)	2976 (79,8)	2976 (79,8)	2975 (79,7)	2970 (79,6)	2944 (78,9)	2891 (77,5)	2808 (75,3)	2684 (71,9)	2513 (67,3)	
950 (65,5)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3138 (84,1)	3123 (83,7)	3085 (82,7)	3021 (81,0)	2924 (78,4)	2789 (74,7)	
1000 (68,9)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3301 (88,5)	3295 (88,3)	3270 (87,6)	3222 (86,4)	3145 (84,3)	3038 (81,4)	
1100 (75,8)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3626 (97,2)	3620 (97,0)	3596 (96,4)	3549 (95,1)	3482 (93,3)	
1200 (82,7)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3952 (106)	3945 (106)	3919 (105)	3878 (104)	
1300 (89,6)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4277 (115)	4245 (114)	
1400 (96,5)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	4602 (123)	

**Table 10. 3-inch (DN 80) Body Capacities with 100% Trim and Body Size Piping (Thousands of SCFH (Nm<sup>3</sup>/h)) of 0.6 Specific Gravity Gas)**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	25 (1,7)	50 (3,5)	75 (5,2)	100 (6,9)	125 (8,6)	150 (10,3)	175 (12,1)	200 (13,8)	225 (15,5)	250 (17,2)	300 (20,7)
50 (3,5)	434 (11,6)										
75 (5,2)	617 (16,5)	561 (15,0)									
100 (6,9)	739 (19,8)	781 (20,9)	668 (17,9)								
150 (10,3)	1133 (30,4)	1133 (30,4)	1126 (30,2)	1052 (28,2)	845 (22,6)						
200 (13,8)	1477 (39,6)	1477 (39,6)	1477 (39,6)	1471 (39,4)	1414 (37,9)	1276 (34,2)	993 (26,6)				
250 (17,2)	1821 (48,8)	1821 (48,8)	1821 (48,8)	1821 (48,8)	1815 (48,6)	1768 (47,4)	1663 (44,6)	1470 (39,4)	1123 (30,1)		
300 (20,7)	2165 (58,0)	2165 (58,0)	2165 (58,0)	2165 (58,0)	2165 (58,0)	2159 (57,9)	2118 (56,8)	2032 (54,5)	1884 (50,5)	1643 (44,0)	
350 (24,1)	2510 (67,3)	2510 (67,3)	2510 (67,3)	2510 (67,3)	2510 (67,3)	2510 (67,3)	2503 (67,1)	2467 (66,1)	2393 (64,1)	2271 (60,9)	1800 (48,2)
400 (27,6)	2854 (76,5)	2854 (76,5)	2854 (76,5)	2854 (76,5)	2854 (76,5)	2854 (76,5)	2854 (76,5)	2847 (76,3)	2814 (75,4)	2749 (73,7)	2491 (66,8)
450 (31,0)	3198 (85,7)	3198 (85,7)	3198 (85,7)	3198 (85,7)	3198 (85,7)	3198 (85,7)	3198 (85,7)	3198 (85,7)	3190 (85,5)	3160 (84,7)	3011 (80,7)
500 (34,5)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3542 (94,9)	3534 (94,7)	3453 (92,5)
550 (38,0)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3886 (104)	3851 (103)
600 (41,4)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4230 (113)	4222 (113)
650 (44,8)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)	4574 (123)
700 (48,3)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)	4918 (132)
750 (51,7)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)	5262 (141)
800 (55,2)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)	5606 (150)
850 (58,6)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)	5950 (159)
900 (62,1)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)	6294 (169)
950 (65,5)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6638 (178)
1000 (68,9)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)
1100 (75,8)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)
1200 (82,7)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)
1300 (89,6)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)
1400 (96,5)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)

**Table 10. 3-inch (DN 80) Body Capacities with 100% Trim and Body Size Piping (continued)**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)									
	325 (22,4)	350 (24,1)	400 (27,6)	425 (29,3)	450 (31,0)	500 (34,5)	550 (38,0)	600 (41,4)	650 (44,8)	700 (48,3)
50 (3,5)										
75 (5,2)										
100 (6,9)										
150 (10,3)										
200 (13,8)										
250 (17,2)										
300 (20,7)										
350 (24,1)	1345 (36,0)									
400 (27,6)	2268 (60,8)	1946 (52,2)								
450 (31,0)	2879 (77,2)	2695 (72,2)	2081 (55,8)	1536 (41,2)						
500 (34,5)	3372 (90,4)	3256 (87,3)	2886 (77,3)	2601 (69,7)	2209 (59,2)					
550 (38,0)	3803 (102)	3729 (100)	3487 (93,5)	3304 (88,5)	3066 (82,2)	2330 (62,4)				
600 (41,4)	4196 (112)	4151 (111)	3990 (107)	3866 (104)	3705 (99,3)	3237 (86,8)	2445 (65,5)			
650 (44,8)	4566 (122)	4541 (122)	4437 (119)	4351 (117)	4238 (114)	3913 (105)	3400 (91,1)	2555 (68,5)		
700 (48,3)	4918 (132)	4909 (132)	4846 (130)	4788 (128)	4709 (126)	4475 (120)	4111 (110)	3556 (95,3)	2658 (71,2)	
750 (51,7)	5262 (141)	5262 (141)	5231 (140)	5193 (139)	5138 (138)	4969 (133)	4701 (126)	4301 (115)	3703 (99,2)	2760 (74,0)
800 (55,2)	5606 (150)	5606 (150)	5597 (150)	5575 (149)	5539 (148)	5418 (145)	5219 (140)	4919 (132)	4481 (120)	3847 (103)
850 (58,6)	5950 (159)	5950 (159)	5950 (159)	5941 (159)	5920 (159)	5836 (156)	5688 (152)	5459 (146)	5125 (137)	4657 (125)
900 (62,1)	6294 (169)	6294 (169)	6294 (169)	6293 (169)	6284 (168)	6231 (167)	6122 (164)	5948 (159)	5687 (152)	5327 (143)
950 (65,5)	6638 (178)	6638 (178)	6638 (178)	6638 (178)	6637 (178)	6608 (177)	6532 (175)	6399 (171)	6194 (166)	5911 (158)
1000 (68,9)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6982 (187)	6972 (187)	6922 (186)	6823 (183)	6662 (179)	6437 (173)
1100 (75,8)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7670 (206)	7659 (205)	7612 (204)	7515 (201)	7374 (198)
1200 (82,7)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8358 (224)	8347 (224)	8295 (222)	8210 (220)
1300 (89,6)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	9046 (242)	8984 (241)
1400 (96,5)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9735 (261)	9375 (251)	9375 (251)

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**Table 11. 4-inch (DN 100) Body Capacities with 100% Trim and Body Size Piping (Thousands of SCFH (Nm<sup>3</sup>/h) of 0.6 Specific Gravity Gas)**

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	25 (1,7)	50 (3,5)	75 (5,2)	100 (6,9)	125 (8,6)	150 (10,3)	175 (12,1)	200 (13,8)	225 (15,5)	250 (17,2)	300 (20,7)
50 (3,5)	709 (19,0)										
75 (5,2)	1004 (26,9)	919 (24,6)									
100 (6,9)	1284 (34,4)	1274 (34,1)	1096 (29,4)								
150 (10,3)	1843 (49,4)	1843 (49,4)	1836 (49,2)	1724 (46,2)	1390 (37,3)						
200 (13,8)	2403 (64,4)	2403 (64,4)	2403 (64,4)	2396 (64,2)	2313 (62,0)	2094 (56,1)	1635 (43,8)				
250 (17,2)	2963 (79,4)	2963 (79,4)	2963 (79,4)	2963 (79,4)	2957 (79,2)	2889 (77,4)	2725 (73,0)	2415 (64,7)	1849 (49,6)		
300 (20,7)	3522 (94,4)	3522 (94,4)	3522 (94,4)	3522 (94,4)	3522 (94,4)	3517 (94,3)	3460 (92,7)	3327 (89,2)	3090 (82,8)	2701 (72,4)	
350 (24,1)	4082 (109)	4082 (109)	4082 (109)	4082 (109)	4082 (109)	4082 (109)	4077 (109)	4027 (108)	3915 (105)	3723 (99,8)	2962 (79,4)
400 (27,6)	4642 (124)	4642 (124)	4642 (124)	4642 (124)	4642 (124)	4642 (124)	4642 (124)	4636 (124)	4592 (123)	4495 (120)	4087 (110)
450 (31,0)	5201 (139)	5201 (139)	5201 (139)	5201 (139)	5201 (139)	5201 (139)	5201 (139)	5201 (139)	5196 (139)	5156 (138)	4929 (132)
500 (34,5)	5761 (154)	5761 (154)	5761 (154)	5761 (154)	5761 (154)	5761 (154)	5761 (154)	5761 (154)	5761 (154)	5756 (154)	5641 (151)
550 (38,0)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6321 (169)	6281 (168)
600 (41,4)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6880 (184)	6875 (184)
650 (44,8)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)	7440 (199)
700 (48,3)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)	8000 (214)
750 (51,7)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)	8559 (229)
800 (55,2)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)	9119 (244)
850 (58,6)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)	9679 (259)
900 (62,1)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)
950 (65,5)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)
1000 (68,9)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)
1100 (75,8)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)
1200 (82,7)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)
1300 (89,6)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)
1400 (96,5)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)

**Table 11. 4-inch (DN 100) Body Capacities with 100% Trim and Body Size Piping (continued)**

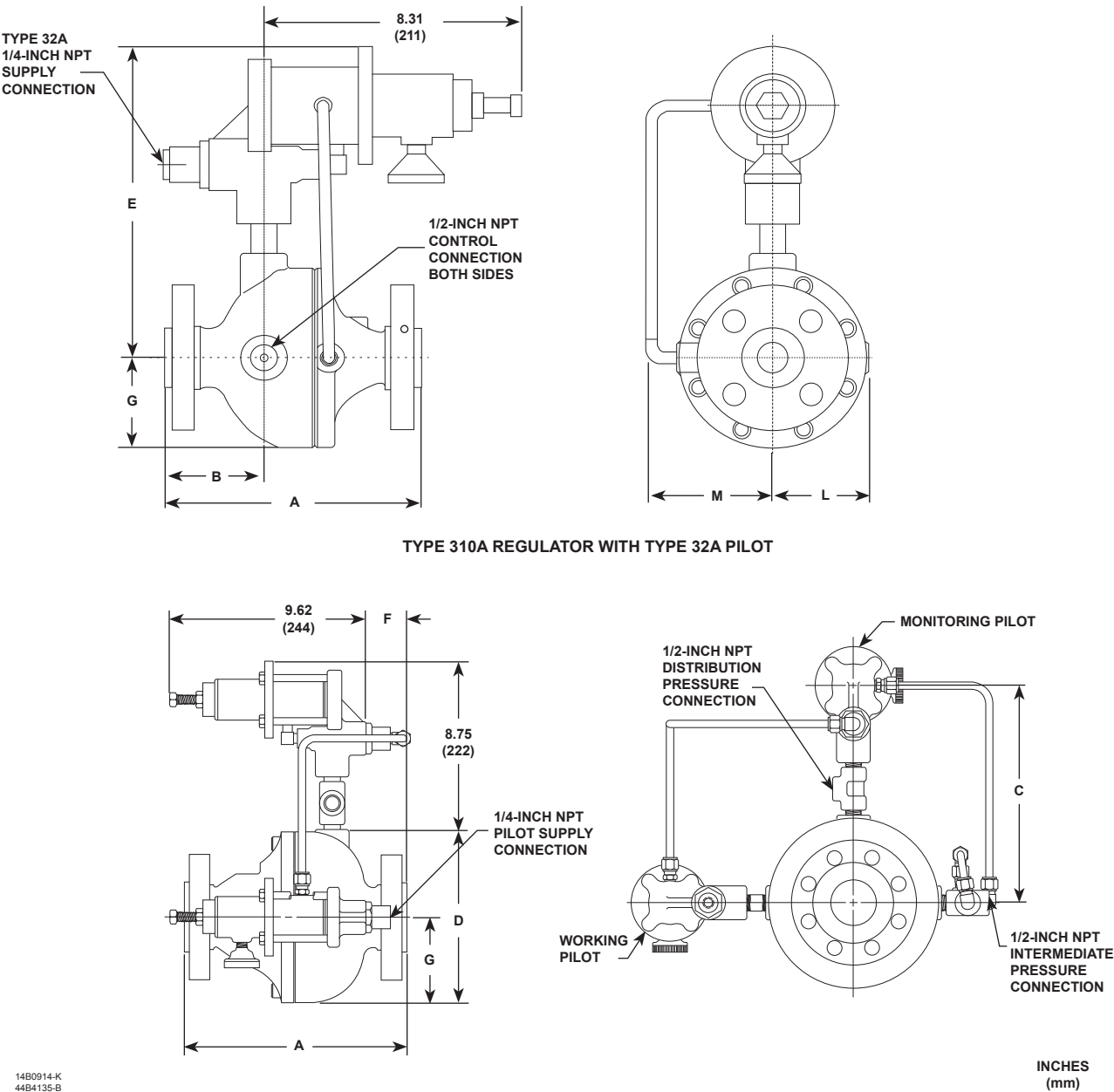
INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	325 (22,4)	350 (24,1)	400 (27,6)	425 (29,3)	450 (31,0)	500 (34,5)	550 (38,0)	600 (41,4)	650 (44,8)	700 (48,3)	
50 (3,5)											
75 (5,2)											
100 (6,9)											
150 (10,3)											
200 (13,8)											
250 (17,2)											
300 (20,7)											
350 (24,1)	2217 (59,4)										
400 (27,6)	3728 (99,9)	3202 (85,8)									
450 (31,0)	4720 (126)	4424 (119)	3427 (91,8)	2533 (67,9)							
500 (34,5)	5517 (148)	5335 (143)	4741 (127)	4278 (115)	3638 (97,5)						
550 (38,0)	6211 (166)	6098 (163)	5717 (153)	5424 (145)	5039 (135)	3837 (103)					
600 (41,4)	6843 (183)	6778 (182)	6531 (175)	6335 (170)	6078 (163)	5322 (143)	4027 (108)				
650 (44,8)	7435 (199)	7404 (198)	7251 (194)	7118 (191)	6942 (186)	6422 (172)	5592 (150)	4209 (113)			
700 (48,3)	8000 (214)	7994 (214)	7909 (212)	7823 (210)	7701 (206)	7334 (197)	6751 (181)	5850 (157)	4380 (117)		
750 (51,7)	8559 (229)	8559 (229)	8527 (229)	8474 (227)	8393 (225)	8132 (218)	7709 (207)	7066 (189)	6093 (163)	4548 (122)	
800 (55,2)	9119 (244)	9119 (244)	9113 (244)	9087 (244)	9038 (242)	8857 (237)	8546 (229)	8070 (216)	7363 (197)	6331 (170)	
850 (58,6)	9679 (259)	9679 (259)	9679 (259)	9673 (259)	9648 (259)	9529 (255)	9303 (249)	8945 (240)	8411 (225)	7654 (205)	
900 (62,1)	10 238 (274)	10 238 (274)	10 238 (274)	10 238 (274)	10 233 (274)	10 163 (272)	10 003 (268)	9734 (261)	9322 (250)	8745 (234)	
950 (65,5)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 798 (289)	10 769 (289)	10 662 (286)	10 462 (280)	10 143 (272)	9694 (260)	
1000 (68,9)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 357 (304)	11 352 (304)	11 288 (303)	11 144 (299)	10 897 (292)	10 545 (283)	
1100 (75,8)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 477 (334)	12 471 (334)	12 411 (333)	12 271 (329)	12 057 (323)	
1200 (82,7)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 596 (364)	13 590 (364)	13 524 (362)	13 403 (359)	
1300 (89,6)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 715 (394)	14 645 (392)	
1400 (96,5)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	15 835 (424)	

**Table 12.** 4 x 6-inch (DN 100 x 150) Body Capacities with 100% Trim and 2:1 Swaged Piping (Thousands of SCFH (Nm<sup>3</sup>/h)) of 0.6 Specific Gravity Gas)

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	25 (1,7)	50 (3,5)	75 (5,2)	100 (6,9)	125 (8,6)	150 (10,3)	175 (12,1)	200 (13,8)	225 (15,5)	250 (17,2)	300 (20,7)
50 (3,5)	933 (25,0)										
75 (5,2)	1342 (36,0)	1199 (32,1)									
100 (6,9)	1716 (46,0)	1686 (45,2)	1423 (38,1)								
150 (10,3)	2465 (66,1)	2465 (66,1)	2434 (65,2)	2253 (60,4)	1794 (48,1)						
200 (13,8)	3213 (86,1)	3213 (86,1)	3213 (86,1)	3180 (85,2)	3035 (81,3)	2720 (72,9)	2104 (56,4)				
250 (17,2)	3961 (106)	3961 (106)	3961 (106)	3961 (106)	3926 (105)	3802 (102)	3555 (95,3)	3126 (83,8)	2375 (63,7)		
300 (20,7)	4709 (126)	4709 (126)	4709 (126)	4709 (126)	4709 (126)	4672 (125)	4561 (122)	4353 (117)	4017 (108)	3488 (93,5)	
350 (24,1)	5457 (146)	5457 (146)	5457 (146)	5457 (146)	5457 (146)	5456 (146)	5417 (145)	5315 (142)	5135 (138)	4835 (130)	3818 (102)
400 (27,6)	6206 (166)	6206 (166)	6206 (166)	6206 (166)	6206 (166)	6206 (166)	6203 (166)	6163 (165)	6067 (163)	5906 (158)	5312 (142)
450 (31,0)	6954 (186)	6954 (186)	6954 (186)	6954 (186)	6954 (186)	6954 (186)	6954 (186)	6949 (186)	6908 (185)	6818 (183)	6453 (173)
500 (34,5)	7702 (206)	7702 (206)	7702 (206)	7702 (206)	7702 (206)	7702 (206)	7702 (206)	7702 (206)	7695 (206)	7653 (205)	7430 (199)
550 (38,0)	8450 (226)	8450 (226)	8450 (226)	8450 (226)	8450 (226)	8450 (226)	8450 (226)	8450 (226)	8450 (226)	8441 (226)	8316 (223)
600 (41,4)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9198 (247)	9144 (245)
650 (44,8)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9947 (267)	9933 (266)
700 (48,3)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)	10 695 (287)
750 (51,7)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)	11 443 (307)
800 (55,2)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)	12 191 (327)
850 (58,6)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)	12 939 (347)
900 (62,1)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)	13 688 (367)
950 (65,5)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)	14 436 (387)
1000 (68,9)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)
1100 (75,8)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)
1200 (82,7)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)
1300 (89,6)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)
1400 (96,5)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)

**Table 12.** 4 x 6-inch (DN 100 x 150) Body Capacities with 100% Trim and 2:1 Swaged Piping (continued)

INLET PRESSURE, PSIG (bar)	OUTLET PRESSURE, PSIG (bar)										
	325 (22,4)	350 (24,1)	400 (27,6)	425 (29,3)	450 (31,0)	500 (34,5)	550 (38,0)	600 (41,4)	650 (44,8)	700 (48,3)	
50 (3,5)											
75 (5,2)											
100 (6,9)											
150 (10,3)											
200 (13,8)											
250 (17,2)											
300 (20,7)											
350 (24,1)	2843 (76,2)										
400 (27,6)	4822 (129)	4123 (110)									
450 (31,0)	6150 (165)	5739 (154)	4407 (118)	3244 (87,0)							
500 (34,5)	7233 (194)	6965 (187)	6139 (165)	5519 (148)	4675 (125)						
550 (38,0)	8188 (219)	8007 (215)	7447 (200)	7039 (189)	6516 (175)	4928 (132)					
600 (41,4)	9064 (243)	8943 (240)	8552 (229)	8266 (222)	7903 (212)	6874 (184)					
650 (44,8)	9889 (265)	9812 (263)	9539 (256)	9332 (250)	9070 (243)	8338 (223)	7216 (193)	5400 (145)			
700 (48,3)	10 679 (286)	10 634 (285)	10 449 (280)	10 299 (276)	10 107 (271)	9565 (256)	8753 (235)	7542 (202)	5622 (151)		
750 (51,7)	11 442 (307)	11 424 (306)	11 306 (303)	11 200 (300)	11 058 (296)	10 651 (285)	10 039 (269)	9151 (245)	7856 (211)	5835 (156)	
800 (55,2)	12 191 (327)	12 190 (327)	12 125 (325)	12 052 (323)	11 950 (320)	11 643 (312)	11 173 (299)	10 494 (281)	9534 (256)	8159 (219)	
850 (58,6)	12 939 (347)	12 939 (347)	12 915 (346)	12 870 (345)	12 799 (343)	12 570 (337)	12 206 (327)	11 676 (313)	10 933 (293)	9903 (265)	
900 (62,1)	13 688 (367)	13 688 (367)	13 684 (367)	13 661 (366)	13 615 (365)	13 449 (360)	13 168 (353)	12 750 (342)	12 161 (326)	11 356 (304)	
950 (65,5)	14 436 (387)	14 436 (387)	14 436 (387)	14 430 (387)	14 430 (387)	14 291 (383)	14 077 (377)	13 746 (368)	13 275 (356)	12 630 (338)	
1000 (68,9)	15 184 (407)	15 184 (407)	15 184 (407)	15 184 (407)	15 177 (407)	15 105 (405)	14 946 (401)	14 686 (394)	14 306 (383)	13 783 (369)	
1100 (75,8)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 680 (447)	16 670 (447)	16 596 (445)	16 442 (441)	16 198 (434)	15 848 (425)	
1200 (82,7)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 177 (487)	18 162 (487)	18 086 (485)	17 937 (481)	17 706 (475)	
1300 (89,6)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 673 (527)	19 654 (527)	19 576 (525)	19 431 (521)	
1400 (96,5)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 170 (567)	21 146 (567)	21 066 (565)	



TYPE 310A REGULATOR WITH TWO TYPE 32A PILOTS FOR WORKING MONITOR SERVICE

BODY SIZE, INCHES (DN)	DIMENSIONS, INCHES (mm)												
	A			B			C	D	E	F	G	L	M
	CL150 RF	CL300 RF	CL600 RF	CL150 RF	CL300 RF	CL600 RF							
1 (25)	----	7.78 (198)	8.28 (210)	----	2.94 (75)	3.19 (81)	9.62 (244)	8.25 (210)	10.56 (268)	2.25 (57)	3.06 (78)	3.56 (90)	4.00 (102)
2 (50)	10.06 (256)	10.53 (267)	11.28 (287)	3.19 (81)	3.44 (87)	3.81 (97)	10.68 (271)	11.25 (286)	11.56 (294)	3.12 (79)	4.44 (113)	4.56 (116)	5.44 (138)
3 (80)	----	12.53 (318)	13.28 (337)	----	3.81 (97)	4.19 (106)	11.50 (292)	13.25 (337)	12.38 (314)	3.12 (79)	5.25 (133)	5.38 (137)	6.25 (159)
4 (100)	----	14.53 (369)	15.53 (394)	----	4.88 (124)	5.38 (137)	13.38 (340)	15.50 (394)	14.25 (362)	3.88 (99)	7.12 (181)	7.25 (184)	8.12 (206)
4 x 6 (100 x 150)	----	16.19 (411)	17.38 (441)	----	4.88 (124)	5.38 (137)	13.38 (340)	15.50 (394)	14.25 (362)	3.88 (99)	7.12 (181)	7.25 (184)	8.00 (203)

Figure 9. Dimensions



## Ordering Guide

### Type (Select One)

- ☐ 310A-32A (one pilot for standard pressure reducing and wide-open monitor applications)\*\*\*
- ☐ 310A-32A-32A (two pilots for working monitor applications)\*\*\*

### Body Size and End Connection Style (Select One)

#### 1-inch (DN 25) Body

- ☐ NPT\*\*\*
- ☐ CL300 RF\*\*\*
- ☐ CL600 RF\*\*\*

#### 2-inch (DN 50) Body

- ☐ CL300 RF\*\*\*
- ☐ CL600 RF\*\*\*

#### 3-inch (DN 80) Body

- ☐ CL300 RF\*\*\*
- ☐ CL600 RF\*\*\*

#### 4-inch (DN 100) Body

- ☐ CL300 RF\*\*\*
- ☐ CL600 RF\*\*\*

#### 4 x 6-inch (DN 100 x 150) Body

- ☐ CL300 RF\*\*\*
- ☐ CL600 RF\*\*\*

### Outlet Pressure Range (Select One)

- ☐ 10 to 20 psig (0,69 to 1,4 bar)\*\*\*
- ☐ 10 to 100 psig (0,69 to 6,9 bar)\*\*\*
- ☐ 100 to 250 psig (6,9 to 17,2 bar)\*\*\*
- ☐ 250 to 600 psig (17,2 to 41,4 bar)\*\*\*
- ☐ 400 to 700 psig (27,6 to 48,3 bar)<sup>(1)</sup>\*\*\*

1. Only available in Nitrile (NBR).

2. Maximum Operating Pressure of 600 psig (41,4 bar).

### Main Valve Trim Size (Select One)

- ☐ 100% **(standard)**\*\*\*
- ☐ 70% (not available on 1-inch (DN 25) body)
- ☐ 50%
- ☐ 30%

### Main Valve Diaphragm and O-Rings (Select One)

- ☐ Nitrile (NBR) **(standard)**\*\*\*
- ☐ Fluorocarbon (FKM)\*\*

### Pilot Diaphragm (Select One)

- ☐ Stainless Steel/Nitrile (NBR) **(standard)**\*\*\*
- ☐ Stainless Steel/Fluorocarbon (FKM)\*\*

### Pilot Valve Disk Assembly (Select One)

- ☐ Nitrile (NBR) **(standard)**\*\*\*
- ☐ Fluorocarbon (FKM)<sup>(2)</sup>\*\*

### Main Valve Replacement Parts Kit (Optional)

- ☐ Yes, send one replacement parts kit to match this order.

### Pilot Replacement Parts Kit (Optional)

- ☐ Yes, send one replacement parts kit to match this order.

Regulators Quick Order Guide	
***	Standard - Readily Available for Shipment
**	Non-Standard - Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

### Specification Worksheet

#### Application (Please designate units):

Specific Use \_\_\_\_\_

Line Size \_\_\_\_\_

Gas Type and Specific Gravity \_\_\_\_\_

Gas Temperature \_\_\_\_\_

Does the Application Require Overpressure Protection?

☐ No ☐ Yes, if so, which is preferred:

☐ Relief Valve ☐ Monitor Regulator ☐ Shutoff Device

Is overpressure protection equipment selection assistance desired? \_\_\_\_\_

#### Pressure (Please designate units):

Maximum Inlet Pressure ( $P_{1max}$ ) \_\_\_\_\_

Minimum Inlet Pressure ( $P_{1min}$ ) \_\_\_\_\_

Downstream Pressure Setting(s) ( $P_2$ ) \_\_\_\_\_

Maximum Flow ( $Q_{max}$ ) \_\_\_\_\_

#### Performance Required:

Accuracy Requirements? \_\_\_\_\_

Need for Extremely Fast Response? \_\_\_\_\_

Other Requirements: \_\_\_\_\_

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